

# ROUNDUP

Lyndon B. Johnson  
Space Center

NASA

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## Orbiter getting ready for Nov. 23 rollout

The orbiter—how it works, its complexities, and its current readiness—was the topic of the fourth in a series of press briefings at JSC last week. Aaron Cohen, manager of the orbiter project for the Space Shuttle Program Office, gave an overview of orbiter development, assuring that most tests had been completed and systems installed. Three items in the Space Transportation System pushed the state of the art: the avionics, the thermal protective tiles, and the main engine. (See story below.)

A series of tests is taking place on the vehicle before its November 23 rollout: the hydraulic system has run concurrently with the flight control system, dynamic stability tests are taking place now, and the crew equipment interface has been verified.

"We roll out on November 23," Cohen said. "We spend a little over four weeks in the VAB (Vehicle Assembly Building) where we mate with the other elements of the system, then move to the pad with

the flight readiness firing set for February 5-7.

Cohen said the tiles should be complete on time—with 1286 left to be put on the vehicle at the time of the briefing, the schedule was "going well."

There are nine pounds per cubic foot of insulation on the orbiter. The tiles are purified sand pulverized into a quartz-type material, then pressed into blocks of

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## Engine success ratio high

Most of the engine problems encountered in Space Shuttle development are "very comparable to what we saw in our Saturn program," said J. R. Thompson, Jr. of Marshall Space Flight Center.

"We had a heck of a time learning to start and operate the J-2 engines, and we had several nozzle problems on that program."

Thompson, who is Space Shuttle Main Engine Project Manager at Marshall, was speaking at the third in a series of pre-launch briefings held at MSFC October 14—topic: the Space Shuttle Main Engine and the Solid Rocket Booster.

Thompson assured that all engine testing is running on schedule for a March 1981 launch. There are two tests remaining and they are scheduled to be completed by the end of this calendar year, he said.

"If you look at the success ratio on the SSME to date, it's a little over .9," Thompson said. "Almost all of the tests

are planned, conducted, and, at least nine-tenths of the time, successful in simulating the mission duration."

He called the Shuttle's cluster rocket system "a very high performing engine compared to the Saturn program."

"This is measured by specific impulse, or, in layman's terms, the gas mileage or efficiency that the engine achieves."

Unlike engines used in prior U.S. space missions, the Space Shuttle main engines have a requirement for long life and reuse, with a targeted design life of 55 missions.

Long life and reuse dominate the design problems for the solid rocket boosters, as well, George B. Hardy, SRB Project Manager at Marshall said at the briefing. "A design driver of some consequence relates to what I refer to as the four 'R's': the recovery, retrieval, refurbishment, and reuse."

See ENGINE SUCCESS Page 4

## Control teams simulate first flight

Columbia prime crew astronauts John W. Young and Robert L. Crippen, and ground-based flight controllers at Johnson Space Center, wrestled imaginary problems for some 55 hours last week in the fourth major simulated flight of the Space Transportation System.

The simulation was terminated 3 p.m. Thursday—minutes before a simulated landing at Edwards Air Force Base, Calif.—due to a failure in the flight simulation facility.

Purpose of the simulation is to provide Space Shuttle astronauts and flight controllers with realistic training, using computers and flight simulators to replicate flight conditions and evaluate actions performed by the air and ground crews. Simulated problems were introduced during the test to accustom the crews to handling a variety of potential anomalies.

Don Puddy, one of the three flight directors participating in the simulation, emphasized that the number of anomalies simulated bears no relationship to confidence in, or frailties anticipated, with the flight hardware. "What we have here is a complex Shuttle flight vehicle, with many redundant systems, and a mission simulator with a large and versatile capability for simulating failures," Puddy said. "The number of anomalies simulated is simply an indication of our using these facilities to their



Crew trainers in the simulator facility, Building 5.

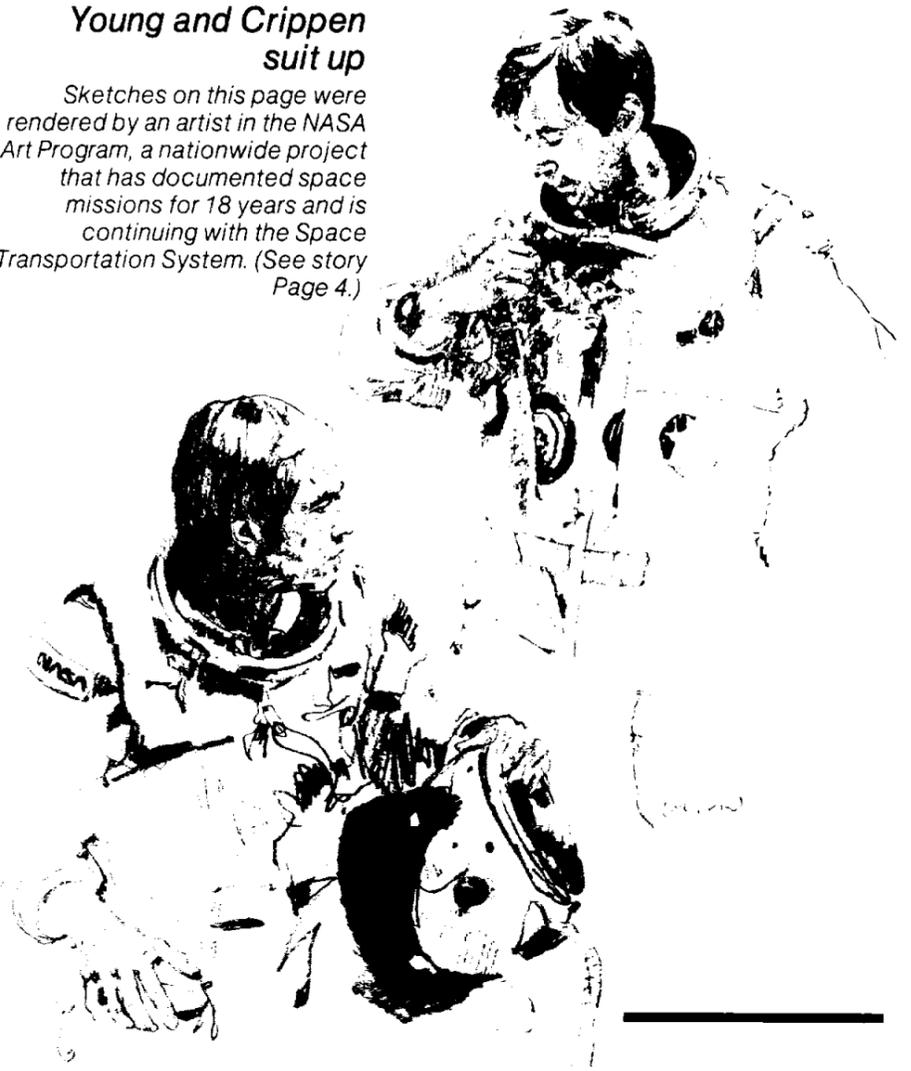
maximum capacities."

The flight directors headed three crews of controllers working in JSC's Mission Operations Control Room. In addition to Puddy, they are Neil B. Hutchinson and Charles R. Lewis.

Despite the high number of anomalies simulated, the Shuttle Mission Simulator performed reliably throughout the test. The simulation was a partial repeat of a

## Young and Crippen suit up

Sketches on this page were rendered by an artist in the NASA Art Program, a nationwide project that has documented space missions for 18 years and is continuing with the Space Transportation System. (See story Page 4.)



## Tax money put into NASA gives returns on investment

The argument against government spending has been growing in this country, but it would not be a case if an agency could be run like an industry, with accountability and a payoff to the investors, according to one school of thought.

NASA, with its kindred industries, "can easily pass that test," said economist Klaus Heiss in a recent speech at

Gilruth Center. "When the government takes billions of dollars to spend on projects, the American people have a right to expect an economic return on that investment."

Heiss, an aerospace consultant, was speaking at a recent meeting of the American Institute of Aeronautics and Astronautics.

The American economy has demonstrated a malaise in the past ten years with its turn towards a "zero-growth, zero-sum" mentality which has translated into zero returns on bonds and equity in the late 1970s, Heiss said.

The roots and heart of the space program are cut out by a no-growth mentality which depends on zero risk and innovation to reach its zero sum. "Without taking risks you have no growth, and with no growth you have nothing to distribute on top of what exists," Heiss said.

So the space program is much affected by the stagflation of the past 10 years, and the space program can be part of the solution, based on Heiss' school of thought, which states you can only have economic growth with technical innovation.

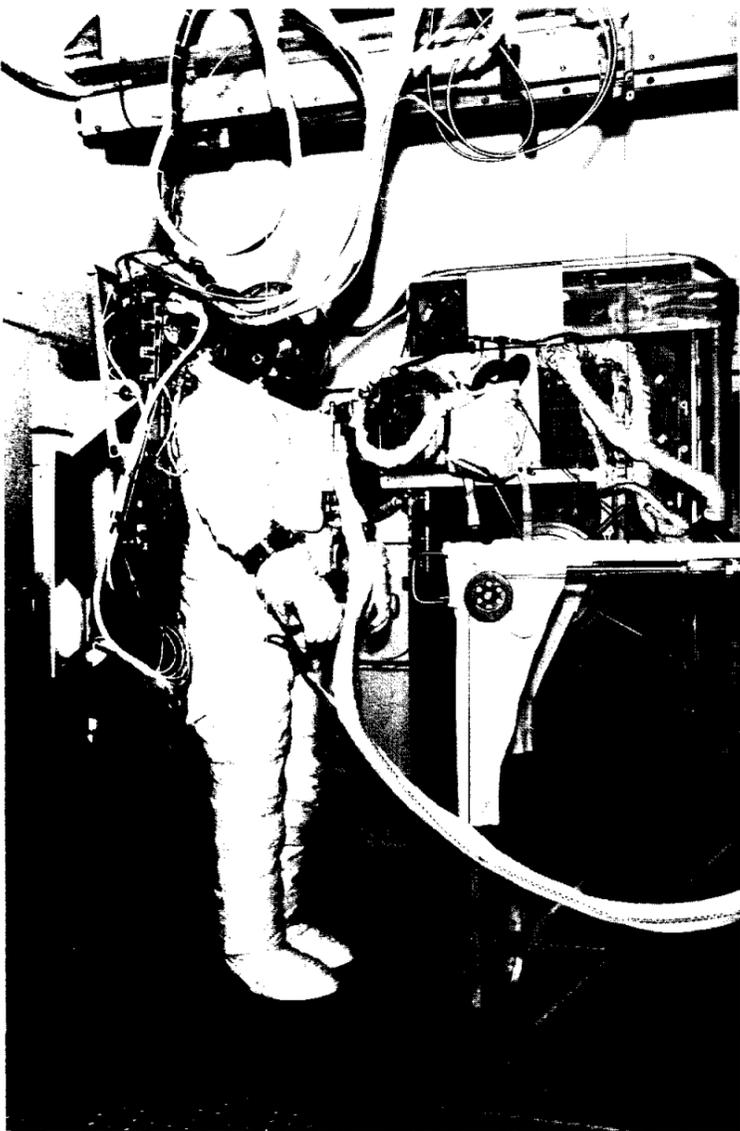
"In a static economy money does not grow—you do not have interest."

Each government program should have accountability and balance between itself and the private sector. ("It's something that stimulates the imagination," Heiss said.) On this account, when compared with other agencies, the space program comes out on top—"in fact we have underfunded space activities by a factor of two to four."

Heiss pointed out that a 2% improvement in the delivery of public health programs would result in billions of dollars

See SIM REPORT Page 4

See IT TAKES Page 4



A SHUTTLE SPACESUIT life support system successfully completed 14 hours of manned tests this month at JSC, simulating spacewalks and certifying the unit for vacuum conditions. The test required the suited subject to exercise at the highest rates expected during extravehicular operations. They proved the caution and warning system's ability to sense problems. The testing follows a flash fire April 18 in the spacesuit secondary oxygen pack in which a Hamilton-Standard technician was burned during a malfunction. Redesign of the high pressure oxygen system resulting from this accident will be certified early next year in a separate test series.

## Driving smart

*Do you really need to make that trip?*

Second in a series on "Driving Smarter" courtesy of the U.S. Department of Energy.

By far the best way to save gas is to stay out of your car.

Without becoming a recluse, you can cut down on your driving enough to save a bundle of money if you go about it systematically.

First, keep a driving record. It can be a detailed record that would pass an audit by a CPA, or just a small notebook of mileage and gallons entries each time you buy gas. You'll get more benefit if you record the purpose of the longer trips and for a few weeks jot down every trip you make.

With the record, you'll be able to tell how much of your driving is essential. Then you can set a realistic target for reduction.



For many people, a 20% mileage reduction for the first three months makes sense. Until you have a month-by-month record for a full year, you won't be able to make steady reductions because your pattern of driving

### NARFE to Meet On 'Vital Topic'

The Houston-NASA Area Chapter 1321 of THE NATIONAL ASSOCIATION OF RETIRED FEDERAL EMPLOYEES will meet on Wednesday, November 5, at 1 p.m. in the Clear Lake Park Building on NASA Road One. George Meador, agent of the Galveston County Agricultural Extension Service, will speak on the impact of the past dry summer and the sustained high temperatures on trees and shrubs. Paul Vavra, program chairman, says that the topic is so vital to us all that he would urge members to attend and participate in the discussion. Visitors are welcome. For more information, call Paul Vavra at 334-2978.

### Mark Your Calendar For AIAA Speakers Series

The American Institute of Aeronautics and Astronautics has a lineup of speakers worth noting this year for its monthly dinner meetings. Programs start at 8 (no charge to attend the program only), with social hour at 6 and dinner at 7—at Gilruth Center. Coming up:

**Senator Harrison Schmitt** November 18: "Today's Outlook for Space."

**William H. Gregory**, editor of *Aviation Week & Space Technology* December 9: "Report on Space."

**Robert W. Rummel**, chair of the Aeronautics & Space Engineering Board, January 20: "Engineering Challenges." (Not confirmed.) January 20 is membership night.

**Dr. Bruce C. Murray**, director of Jet Propulsion Laboratory, February 17: "The Science of Space."

# Bulletin Board

**Bob O. Evans**, vice-president of IBM, March 24: "Future Technologies in Data Processing."

**Dr. Arthur Mager**, Group vice-president for engineering of Aerospace Corporation, April 21: "AIAA and the Houston Section." Mager is current president of AIAA.

### EAA Selling Rocket Tickets

The Houston Rockets will be coming up against the Phoenix Suns, the San Antonio Spurs, the Portland Trail Blazers, the L. A. Lakers, and the San Antonio Spurs in town this year. EAA tickets will be on sale in the Building 11 Exchange Store as they come available for each game.

### Toastmasters, You, And a Successful Business

No matter what your occupation, you need to communicate. Your success depends on how well you can express yourself. Toastmasters gives you the tool to speak up and be more effective in your business or on your job. It will improve your ability to: (1) Say what you are thinking, (2) think what you are saying, and (3) listen to the ideas of others and evaluate them.

Come visit the Spaceland Toastmasters Club and observe how others are learning how to master these skills that could be such a great asset to you in your business. They meet the first and third Wednesday of each month at Franco's (Flying Pizza), 1101 NASA Road One, 11:30 a.m. For more information, call Steve Jacobs at x3561, or Emmit Fisher at x3278.

### R/C Club to Sponsor Scale Fly In

On November 15 and 16, the MSC R/C Club will sponsor an R/C scale fly-in. The contest was originally planned for September 27 and 28 but was rescheduled due to heavy rain. Fly-in categories include bi-plane, 1/2 A, monoplane pre-W.W. II, monoplane WW-II and later, and Mammoth scale. Static judging will be on Saturday, November 15 between 10 a.m. and 2 p.m. The flight line will be open from 10 a.m. Saturday until the end of the contest on Sunday. The fly-in activities will take place behind Building 14 on the antenna range. Observation of the fly-in activities is open to the public—so come on out and enjoy yourself. Some of the WW-II scale models you will see on static display are: P-47, P-51, PT-17, and P-39. In the Mammoth scale area (1/4 scale), we expect to have a stagger wing beechcraft, spitfire, Steen skybolt, and many more. For additional information, call O. G. Morris, Contest Director, at 334-1407, or Don White at 488-1024.

### Ski Fashion Show: Get Ready for Snow

Friday, November 7, the Clear Lake Area Ski Club will have its annual Ski Fashion Show at Harris County Park on NASA Road One. Members from the club will model the latest in ski wear. Social hour is 7 to 8 p.m., with the fashion show starting at 8. In the past the audiences have won many door prizes and had a few surprises thrown in, so who knows what the program director will come up with this year? Come and bring your friends.

## Cookin' in the cafeteria

### Week of November 3 - 7

**Monday:** French Onion Soup; BBQ Sliced Beef; Parmesan Steak; Spare Rib w/Kraut; Chili & Macaroni (Special); Ranch Style Beans; English Peas; Mustard Greens. Standard Daily Items: Roast Beef; Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

**Tuesday:** Split Pea Soup; Meatballs & Spaghetti; Liver & Onions; Baked Ham w/Sauce; Corned Beef Hash (Special); Buttered Cabbage; Cream Style Corn, Whipped Potatoes.

**Wednesday:** Seafood Gumbo; Cheese Enchiladas; Roast Pork w/Dressing; BBQ Link (Special); Pinto Beans; Spanish Rice; Turnip Greens.

**Thursday:** Beef & Barley Soup; Roast Beef w/Dressing; Fried Perch; Lasagne w/Meat; Chopped Sirloin; Chicken Fried Steak (Special); Whipped Potatoes; Peas & Carrots; Buttered Squash.

**Friday:** Seafood Gumbo; Fried Shrimp; Baked Fish; Beef Stroganoff;

Fried Chicken (Special); Okra & Tomatoes; Buttered Broccoli; Carrots in Cream Sauce.

### Week of November 10 - 14

**Monday:** Cream of Potato Soup; Franks & Sauerkraut; Stuffed Pork Chop; Potato Baked Chicken; Meat Sauce & Spaghetti (Special); French Beans; Buttered Squash; Buttered Beans. Standard Daily Items: Roast Beef; Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

### Tuesday: HOLIDAY

**Wednesday:** Seafood Gumbo; Roast Beef; Baked Perch; Chicken Pan Pie; Salmon Croquette (Special); Mustard Greens; Italian Green Beans; Sliced Beets.

**Thursday:** Beef & Barley Soup; Beef Tacos; Diced Ham w/Lima Beans; Stuffed Cabbage (Special); Ranch Style Beans; Brussels Sprouts; Cream Style Corn.

**Friday:** Seafood Gumbo; Fried Shrimp; Deviled Crabs; Ham Steak; Salisbury Steak (Special); Buttered Carrots; Green Beans; June Peas.

varies too much with the seasons.

It may help to divide your trips into categories such as work, home (shopping, school, errands), and recreation.

### Work

Only you can tell whether it is essential that you drive alone to work every day. But before you decide it is impossible to carpool and is unreasonable to ride a bike or walk, ask yourself: "If gasoline were \$10 a gallon, would I still drive?"

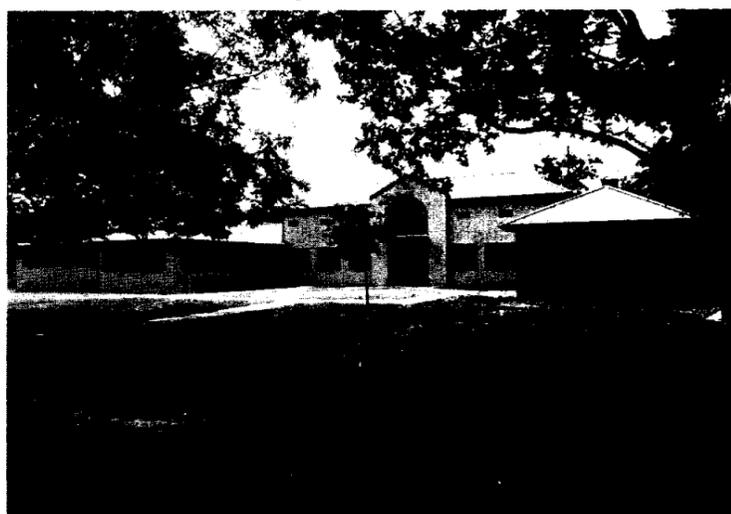
Even one day a week of carpooling or riding the bus could cut your work driving by nearly 20%.

Household driving is easy to reduce, but only if you keep records. Without records, it is like

See *DRIVING SMART* Page 3



JUST LAST WINTER it was a barn with cows and pigs. Now McGetchin Hall houses every photo taken of the Moon by U.S. spacecraft, geological maps of Earth and other planets, and Voyager imagery; and additions are in the plans including a ready darkroom for blowups. Researchers should call Peter Schulz at 486-2174 for more information about the newest addition to the Lunar Planetary Institute.





ELLISON ONIZUKA SETS precedent for military mission specialist astronauts who have completed NASA training, as he receives "ob-

server" wings from Former Astronaut Thomas P. Stafford. Air Force Secretary Hans Mark and Center Director Christopher C. Kraft look on.

## 'I could not fully perform my duties without her help'

Efficiency is the word that describes Lillian Anderson. In addition to her duties as branch secretary for Aircraft Systems Quality Assurance—typing; answering phones; arranging travel; time and attendance cards—she displays a conscientious attitude by performing duties beyond her job description.

Anderson was recently named



Lillian Anderson

Outstanding Secretary for September 1980.

In her eight years as branch secretary she has acquired knowledge about the organization and programs of the branch and the relationship of the branch to the division, the directorate, and other government agencies. As a result, Aircraft Systems Quality Assurance correspondence is handled effectively and accurately.

"I recognize that I could not fully perform my duties without her help," says Branch Chief George Bosworth.

He especially appreciates the fact that she is always available for work. "Mrs. Anderson is very conscious to schedule her annual leave around her workload," Bosworth says.

He adds that although she is constantly subjected to rush tasks, she efficiently meets deadlines.

## Driving Smart

From Page 2

trying to lose weight without ever stepping on the scales: you could spend a lot of time fooling yourself.

If you chauffeur the kids to school or to little league, work out a ride-sharing routine with a neighbor. Or, if it's safe, insist the kids ride their bikes three days a week, or that they walk every Friday.

If you run numerous errands for yourself or the children, set some limits, such as only one trip a day, or three days a week, or only between four and five p.m.

When shopping for unusual items, call ahead to find a store that has them. Then jot down the miles you save by not making a useless trip, and congratulate yourself.

You also can save gas by combining errands into one trip. A car that has been warmed up gets better mileage than one that is cold. Even if you have to make six stops on a trip, you'll get better

## Playin' at the Rec Center

**10th NASA Intercenter Run** - will be held during the week of November 17-22. Here's your chance to represent JSC in a 10km and 2m run against all other NASA Centers. In order to allow as many people as possible to run, we will conduct races every day during the week. A schedule of race times will be sent to each employee.

The race, conducted twice yearly, was won by JSC in April 1980.

A change in the program format this time will not allow dependents or spouses to count in the scoring. Thus, we need many more JSC employees to get out and run for the center.

In an effort to spur on participation, the Rec Center will offer trophies to small and large NASA divisions as well as small and large Contractors, who turn out the greatest number of participants for the race.

Call Carl McCollum at x3594 for more details.

**Defensive Driving** - This is your last opportunity this year to learn the art of safe driving and qualify for a 10% reduction in your auto insurance. This class will be held at the Gilruth Rec Center Saturday, November 15 from 8 a.m. - 5 p.m. Cost is \$15 per person.

**Saturday at the Movies** - the next children's movie will be held on Saturday, November 15 at 10 a.m. - 12 noon. Program consists of the Disney Classic, "THE JUNGLE BOOK," as well as cartoons, popcorn and cokes. Cost is \$1 per person.

Tickets may be purchased at Bldg. 11 Exchange Store Monday-Friday 10 a.m. - 2 p.m.

For any information regarding sports or leisure time classes please contact Carl McCollum or Ken Keeler at x3594.

mileage with the warmed-up car, and you'll probably save miles as well.

### Recreation

Don't eliminate recreation, but do set a goal of reducing the amount of gas you burn. If you own a boat, reduce your use of it (and

the drive to the lake) by one fourth. Then reward yourself with a dinner out in a nearby restaurant or a visit with friends.

Study your pattern of recreational driving. Then set a modest goal. Each time you substitute a short recreational trip for a longer one, give yourself a miles-saved credit, and add up the credits once a month.

### Goals and Rewards

Goals and rewards are very important, especially if there are several drivers in the household. You may want to keep a chart in the kitchen to record your progress, and, if there are teenage drivers, you may need to make the rewards fairly substantial.

Rewards should be frequent: once a month for children, perhaps once a quarter for adults.

In the next article we'll tell you how to drive farther for less both in the city and on the highway.

Due to crop failure there will not be a pecan harvest this year.

Roundup deadline is the first Wednesday after publication.



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Editor..... Kay Ebeling

# Roundup Swap Shop

Ads must be under 20 words total per person, double spaced, and typed or printed. Deadline for submitting or cancelling ads is 5 p.m. the first Wednesday after publication. Send ads to AP3 Roundup, or deliver them to the Newsroom, Building 2 annex. No phone-in ads will be taken. Swap Shop is open to JSC federal and on-site contractor employees for non-commercial personal ads.

### BOATS & PLANES

"LIDO-14" Sailboats: New/Used-Family sailing/racing. Popular boat/big fleet. Excellent investment, 334-2392 or 482-7305.

14' alum. boat/9.8 Mercury/Perfect for bass, duck hunting. Lots of extras-\$950. Parker X4241 or 481-4372.

### CYCLES

79 Suzuki, DS dirt bike, almost brand new, \$500. X5565 or 334-2894. R. Morton.

1976 Yamaha YZ250 dirt bike. New rear tires. Exc. cond. throughout. Accessories included. \$475. 943-1516 after 5 p.m.

FOR SALE: Motorcycle — 1975 Honda 55, exc. cond., must see to appreciate. New airhorns. Call Lupe at 5473 or 480-4178.

### PETS

Ferret, 6 mo. old, female Siamese, \$35., 485-5106.

### LOST & FOUND

LOST: Softball glove & warm-up jacket, left at softball field No. 1. Has name on it, jacket is dark blue. Dave Glover x3025.

### WANTED

Roommate to share mutually located apartment, townhouse, or house beginning in January 1981. Call 2781 or 333-3525.

Junked-out bicycle frame. Only need bottom bracket capable of holding quality crankset. Samouce x2568.

Bench seat for van. Schultz 334-3046.

### HOUSEHOLD ARTICLES

Draperies, gold, lined, pinch-pleated. Each panel 93 inches long, 8 feet wide. Two panels cover wall 8 ft. by 16 ft. \$10. Germany, x3338, 643-4456 after 6 p.m.

Refrigerator, Avocado, frost-free with icemaker. \$90 Tom X4528.

108" sofa, good cond. \$100; 6 pc Dinette Set, \$75; Green recliner w/heat, vibrator, \$100. Durst 471-0520.

Litton Meal-In-One Microwave Oven, Model 1570, almost new. Ron Grabe x3857, 488-6549.

Custom Drapes (Earth tone colors), curtains, woven woods, curtain rods, almost new. Ron Grabe x3856, 488-6549.

Two matching table lamps, \$10 ea.; hanging lamp, \$35; GE electric skillet, \$10; wooden sewing accessory chest, \$15; Sears packing for dishes and glassware, \$10. 333-5758.

Executive Oak desk, \$750; wool rug, 9x12 Chinese Ming exc. cond., \$800. Dave x2931.

3 pc. Formica top end tables with corner, good cond., \$45; high-back chair, Spanish style, exc. cond., \$45. 643-8170 or X6241.

Space-Saving custom-built single bed with hideaway storage compartments. Mattress included, \$75. Call 643-8944 after 5:30.

### PROPERTY & RENTALS

SALE: League City, Pecan Forest, 4-2-2A, large kitchen, walk-in closets, custom drapes, nonescalating 8-1/4% loan or 2nd mortgage, immediate occupancy. Nick Lance x3343.

LEASE: Pebblebrook Condo, 1-1 all appl., washer & dryer, tennis, pool, icemaker, a lot more, close to JSC - in the woods! No Pets. \$310. 483-2205/481-3450 eves.

LEASE/OPTION To Buy: Friendswood, 3-2-1, drapes, fenced, near schools, very clean. \$425/mo. 482-7546.

LEASE: Miramar, 3-2-2, living room, family room, fenced. Near pool, schools, shopping. \$400 mo/1st and last. 471-0520.

LEASE: Clear Lake City: Baywind Condo! 2-2-2, \$375/mo + deposit. Charles, x4226 or 476-7461.

FOR SALE: Ranchett 57.7 acres 80% clear. Good house needs repair, near Crockett Tex. \$1240 per acre. 944-4972 after 5:45 p.m.

RENT: One furnished bedroom in a 3-br house in Friendswood. Kitchen, laundry privileges. \$160 mo. Call Jeff, x7429 or 482-5893 after 5 p.m.

FOR SALE: By owner, 706 Reynolds, League City, Brick, 3-1-1/2-2A. \$10,000 equity, assume 10% VA loan. Gina X3377, 332-6940.

SALE: Glen Cove (League City), 3-2-2A, trees, fenced, under \$50 k, financing, negotiable. 488-1410 after 5 p.m.

SALE: Spacious home on bay side of Todville Road. Seabrook. Beautiful water view. Many extras. 8-1/2% VA non-escalating. 474-4892 after 5 p.m.

RENT: Lake Livingston retreat, 3 br, water front, under the trees, all amenities by week or wk/nd. Jerry 4207 or 554-6093.

### CARS & TRUCKS

New! 2 Polyester 4-ply G78X15 tires, used 2 weeks only, \$45 each. x3031 or x2358, after 6:30 p.m. Call 332-2279.

76 Rabbit, 4 spd, a/c, radio, brown, exceptionally clean, make offer. 486-8938 after 4 p.m.

75 Camaro, pb/ps & am/fm tape, 350 V-8, new tires. \$2750. 333-3279 after 5 p.m.

1955 Chev. 2 dr, 327 V-8, 400 Trans, body restored. Needs final paint, and upholstery. \$2000 or trade for Mustang or boat. T. Thompson, x3670.

73 GMC p/u. 454 V-8, auto, camper shell. Extra tank, cruise control, 55,400 miles. \$1400. Evans, x4576 or 554-2823 after 5 p.m.

75 white Plymouth Duster — needs some body work but runs good! Any offer considered. X4231.

Cadillac-Coupe de Ville d'Elegance '77. Silver/blue velour, stereo, tape, wire wheels, loaded. 38,000 miles. \$5750. 995-1999, eves 729-5481.

1980 Plymouth TC3 with Turismo package. Cast aluminum wheels. \$500 and take over payments. Jack Dial X6434.

1976 Buick Opal, 4-speed, a/c, am/fm radio. One owner, very good cond. 44,500 miles. \$2250 Eileen at x2141.

'67 Chevelle, 400 SB engine, hot rod, exc. cond. \$1500 or best offer. Call Mark at x6134 or 482-5393.

### MISCELLANEOUS

FOR SALE: 60 packs of 25 all different worldwide stamps. \$1 each. William Chanis x3048.

RECORD COLLECTORS SALE: Entire collection of 78 rpm (original) Glenn Miller, Artie Shaw, Tommy, Jimmy Dorsey, Paul Whiteman, etc. albums. Exc. cond. x4381 or 488-1256.

FOR SALE: French fur rabbit coat, w/bl/br, with leather tie-belt. Size 9/10; Never worn \$100. Call 332-2207.

RCA 19' black & white TV, good working condition, \$35; 19' TV cart, one year old, \$9. 488-2735.

Lighted portable sign with letters, one year old, cost \$550 will sell for \$300. McPhillips, 337-1647.

'78 camper shell. Short bed, paneled inside, never been removed. \$200. x3231 Lonnie.

Children's Fiberglass skis—100 cm with Besser Bindings & Kneissel Poles, all for \$30. 488-3276.

FOR SALE: 3 hp. Briggs & Stratton 4-cycle engine in working condition. \$10. Call Earl, x3116 or 334-2354.

FOR SALE: 1972 22 ft. Prowler Travel trailer. Exc. cond. fully equipped. Call 333-3673 after 6 p.m.

Backpack, aluminum frame, medium size suitable for teenager or small adult. \$5. Germany x3338 or 643-4456 after 6 p.m.

CRC Handbook of Radioactive Nuclides, 960 p. \$10; Bureau of Standards Handbook of Mathematical Tables and Functions, 1046 p. \$8. 333-5758.

### CARPOOLS

Need ride from Bellaire-Meyerland area to Bldg. 17. 7:30-8 am to 4:30-5 pm. Phone Joe Peacock x5174.

## It takes risk and innovation

From Page 1

saved by the federal government—two or three times the space program's current budget. The U.S. spends 8% on education, as compared to other countries' 3-4%, and yet there are people graduating in New York who cannot read and write.

"Zero sum means the pie doesn't grow any more," Heiss said. "Hence, as soon as you give one segment more of the pie, another side has to lose."

At the same time AT&T in 1980 will put close to \$15 billion into new investments—equipment—much of it based on technology that's grown out of the space program. AT&T is investing in improved telephone calls.

As long as there's a customer, the product is accountable.

"NASA's goals have to make economic sense," Heiss said. "Just to say 'hey, great, let's go to Mars,' is not enough. By spending money on space we don't suddenly create an economy that will explode."

But the space program has cut itself short on economic accountability, Heiss said. The program needs goals that can

be explained in terms of economic payoffs in the next 10 years—direct payoffs, not spinoffs, but ways the projects will revolutionize an industry such as communications in the next 10 years.

A strong and massive presence in geosynchronous orbit makes economic sense for the U.S. in the next 10 years, Heiss said. "Whether in communications, observations, applications, science, commercial, or defense—'geosynchronous orbit is the next goal for the U.S. in space.'"

"Every project has to make direct economic sense. Not in the sense of profit and loss statements, but in the sense of taking a nation's investments and making them pay off in terms of the nation's economic well being."

The United States once had a strong margin of superiority in space. "We may still have a margin of safety, but if we don't revitalize the space program, that margin may be gone soon, if it is not gone already. The competition is catching up."

"If we don't take risks and innovate, we are condemned to zero growth and a zero sum society."

## Orbiter meeting challenges

From Page 1

ceramic. The process employs three contracting companies.

NASA measures the conductivity, then contours the tile to the shape of the vehicle, an innovative application of descriptive geometry.

To take care of any gap, the accuracy had to be numerically controlled—"and we accomplished that," Cohen said.

The system that interfaces the crew with the onboard computers has undergone "many hours" of testing at Kennedy

Space Center as well as in the simulators and the SAIL at JSC.

"Tying the hardware, the software, and the muscle together was quite a challenge," Cohen said.

The fifth briefing on the Space Transportation System will take place in the Building Two conference room at 1 p.m. November 5; topic—The Orbital Flight Tests. Astronaut Donald K. "Deke" Slayton will conduct the briefing.

## Engine success ratio over .9

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bishment, and reuse of the solid rocket boosters."

The two boosters ignite on the launch pad and burn parallel with the three liquid engines for the initial boost phase of a Space Shuttle launch. During this first phase the vehicle reaches a 4400 feet per second velocity and an altitude of 24 miles.

The phase from ignition to burnout of the solid rocket motors is approximately two minutes. Then on signal from the orbiter, the two motors separate from the vehicle, continue to coast to an apogee of 225,000 feet, then fall into the Atlantic at a design water impact velocity of 85 feet per second, or 60 miles an hour.

They are retrieved and towed back to the launch site where they start their cycle for reuse.

## Voyager One views Saturn next 2 weeks

Houstonians will be able to view closeup video of Saturn and its moons on PBS Channel 8: November 11 the "Far Encounter" will air 5:30 to 6:30 p.m., November 12 "Close Encounter" will air from 4 to 7 p.m., and November 13 a program on "The Moons" will be shown 5:30 to 6:30 p.m.

Travelling at 45,000 mph, Voyager One was 12.5 million miles from Saturn at *Roundup* press time, heading for its close encounter with the planet November 12.

Images of the moons, especially Titan and Rhea, will start coming in to the control center at Jet Propulsion Labs in California November 6. These are a new size class of planetary bodies and project scientists say, "We're bound to be surprised at what we find," based on the experience of the Voyager encounter with Jupiter last year.

Already two new moons were discovered in data coming in from the spacecraft last weekend.

The moon Titan is the giant of the Saturnian system, and with its methane atmosphere it is of prime interest to proj-

ect scientists. They hope to find breaks in the clouds so images will come in of the surface where there may be pools of liquid natural gas.

Rhea is expected to resemble other large moons in the Galilean system although uncertainties about densities of all the Saturn satellites are great enough that they could range from ice bodies to mixtures of ice and rock.

Voyager One will fly as close as 4500 km above the surface of Titan, then up through the rings, past Saturn to as close



IT'S QUIETER IN THE AIRLINES OFFICE, now that ticket agents can call up information on availability of nearly any flight on the office's new SABRE terminals which connect them to a computer in Tulsa. Above, Dorothy White, Cynthia Littlefield, and John Scott make reservations for JSC employee's personal and business travel.

## NASA artists sketch at JSC

A group from the NASA Art Program sketched through a long duration flight simulation last June, and the work of one artist, Henry Casselli, is featured on page one.

For the past 18 years NASA has commissioned nationally known artists to pictorially document man's

progress in space. Artists from traditionalists to modernists have observed launches, piloted simulators, and ridden recovery ships; and the project will continue with the growth of the Space Transportation System.

The work of Hugh Laidman will be featured in a future issue of *Roundup*.

## Sim report

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trol system, and a leak in a liquid hydrogen fuel cell. Flight controllers advised the crew to power down the spacecraft and made plans for an early reentry on Wednesday, with capability for a wave-off and a 24-hour extension.

Upon exercising a deorbit burn Wednesday, the flight team encountered simulated failures in the Orbital Maneuvering System—the primary system for reducing the vehicle's orbital velocity prior to reentry. Failures of both primary and secondary OMS were discovered during *Columbia's* final secondary opportunity to recover at the primary landing site. *Columbia's* Reaction Control System was then called into play as the backup deorbit system for the next opportunity to recover at Edwards during orbit 36 on Thursday.

A nominal burn was performed early Thursday afternoon using the Reaction Control System, and data looked good for recovery at Edwards as the simulator began to malfunction. Rather than tie up the flight team for the time necessary to bring the simulator back on line, and since only a brief portion of the mission remained, the determination was made to terminate the exercise at that point.

Three more long-duration simulations are scheduled before the first Shuttle launch. The next is planned for November 18-20.



as 330,000 km from the planet, then on to Rhea. After the encounter Voyager One will leave the solar system at 35 degrees to the ecliptic.

Voyager Two, now in a quiet cruise mode, will arrive at Saturn in August 1981, then fly on to Uranus in January of 1986, and possibly on to Neptune.

The above photo was taken September 17 at 76 million km distance. Titan can be seen in the upper right corner.